

DDESB/DESCIM ENHANCEMENT OF AUTOMATED SYSTEMS

By



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**28th DoD Explosives Safety Seminar
18 – 20 August, 1998
Orlando, Florida**

ABSTRACT

The Department of Defense Explosives Safety Board (DDESB) has oversight responsibility for manufacturing, testing, handling, maintenance, development, demilitarization, disposal, transportation and storage of ammunition and explosives of the Department of Defense (DoD) explosives safety community.

The Defense Environmental Corporate Information Management (DESCIM) Program Management Office (PMO), working under the direction of the Office of the Deputy Under Secretary of Defense for Environmental Security (DUSD(ES)) is responsible for the identification and enhancement of automated systems that assist the DDESB and DoD explosives safety community to efficiently perform their functions. The DESCIM PMO and DDESB have identified five main functional areas of explosives safety. These automated functional areas are known as the Defense Explosives Safety Management Suite (DESMS).

1. Explosives Safety Policy
2. Accident, Incident, and Malfunction Reporting and Analysis
3. Explosion Models
4. Site Planning, Waivers, and Exemptions
5. Unexploded Ordnance (UXO/Ordnance and Explosive Waste (OEW) Contaminated Lands)

Report Documentation Page				Form Approved OMB No. 0704-0188	
Public reporting burden for the collection of information is estimated to average 1 hour per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to Washington Headquarters Services, Directorate for Information Operations and Reports, 1215 Jefferson Davis Highway, Suite 1204, Arlington VA 22202-4302. Respondents should be aware that notwithstanding any other provision of law, no person shall be subject to a penalty for failing to comply with a collection of information if it does not display a currently valid OMB control number.					
1. REPORT DATE AUG 1998		2. REPORT TYPE		3. DATES COVERED 00-00-1998 to 00-00-1998	
4. TITLE AND SUBTITLE DDESB/DESCIM Enhancement of Automated Systems				5a. CONTRACT NUMBER	
				5b. GRANT NUMBER	
				5c. PROGRAM ELEMENT NUMBER	
6. AUTHOR(S)				5d. PROJECT NUMBER	
				5e. TASK NUMBER	
				5f. WORK UNIT NUMBER	
7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) Naval Facilities Engineering Service Center, NFESC,1322 Patterson Ave. SE, Suite 1000 ,Washington Navy Yard,DC, 20374-506				8. PERFORMING ORGANIZATION REPORT NUMBER	
9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES)				10. SPONSOR/MONITOR'S ACRONYM(S)	
				11. SPONSOR/MONITOR'S REPORT NUMBER(S)	
12. DISTRIBUTION/AVAILABILITY STATEMENT Approved for public release; distribution unlimited					
13. SUPPLEMENTARY NOTES See also ADM001002. Proceedings of the Twenty-Eighth DoD Explosives Safety Seminar Held in Orlando, FL on 18-20 August 1998.					
14. ABSTRACT see report					
15. SUBJECT TERMS					
16. SECURITY CLASSIFICATION OF:			17. LIMITATION OF ABSTRACT Same as Report (SAR)	18. NUMBER OF PAGES 9	19a. NAME OF RESPONSIBLE PERSON
a. REPORT unclassified	b. ABSTRACT unclassified	c. THIS PAGE unclassified			

In recent years, DESCIM has been organizing and funding migration systems in each of the above areas consistent with their tasking from DUSD(ES). A status is given in this paper of work accomplished to date and future work planned for DESMS. The development effort is intended to fulfill functional requirements to enhance Explosives Safety management and information needs at the installation level. It is also intended to facilitate the sharing of accurate and timely explosives safety data reporting at various levels of management above the installation level to meet the multi-level information needs of higher command echelons.

DESMS AND INSTALLATION PLANNING

Commanding officers have the responsibility for the management of land and facilities at their installation or activity. Some activities have personnel operating as full time activity planners, some have planners on a collateral basis. Some activities have no planner on site but use a supporting agency to perform those functions. However the planning is performed, the CO and his staff need to have at their fingertips information that gives them a continuity of planning over periods of five to ten years or more. They need to look into the past to know why things at the activity were built the way they were, why things were done the way they were and understand the history of relations with the local community.

The Installation Master Plan

The activity usually operates under a guiding document called the master plan. The master plan and other supporting plans and documents are painstakingly prepared and periodically updated to reflect the evolving land and facility requirements of an activity to ensure they can successfully accomplish their mission. These planning documents track land and facilities compatibility planning, location of property boundaries, archaeological sites, historical sites, explosives handling and storage facilities, air installation compatibility use zones (AICUZ), and Electromagnetic Radiation Safety areas. The master plan also tracks resource management plans, traffic studies, hazardous materials dump sites, steep sloping land, poor soil that is unsuitable for building, government constraints, etc...

The CO and the activity planner have to deal with numerous constraints to development at the activity. These constraints are generally natural constraints, man-made constraints, or government constraints. Man-made constraints are typically hazardous material disposal areas, ordnance contamination areas, security, range safety, existing infrastructure, and explosives safety criteria. Examples of natural constraints are topography, geology, soils and hydrology. Government constraints often come in the form of protected areas for wetlands, coastal zones, wildlife and culture.

Explosives Facilities Siting

As has been demonstrated here, Explosives Safety Quantity-Distance (ESQD) constraints are only one of numerous constraints faced by the CO and the activity planners with regards to facility planning and maintenance. Explosives Safety siting, is therefore a subset of the overall activity planning responsibilities. The amount of data, information and regulations that have to

be tracked by an activity to successfully fulfill its mission can be almost overwhelming. The rapid evolution of computer hardware and software technology to assist us in tracking it all is a great blessing if we apply the technology wisely.

Sharing of Data at the Installation

Data supporting the numerous functional areas tracked at an activity are usually maintained by individual experts. These experts are specialists in their field that have a clear vision of what they need to do and what they would like to do with their data in the computer environment. One does not need to study the subject very long to realize that all of these functional areas have some common data interests. The problem that we are facing today is that there are numerous independent efforts to automate data tracking and management within the government, and it is currently not being coordinated well. Not all the data tracked at an activity is common, but much of it is. The most common thread of data between the functional areas of an installation is the base facilities map. Common sense tells us that it is prudent for the data from each of the functional areas to be compatible with the format of the installation master plan. It is inefficient and often counterproductive for functionals to duplicate overlapping data. Why maintain two sets of road and facility maps, one for mapping environmentally sensitive areas and another for utilities management when both functional areas could overlay their unique data over one single official installation map maintained by the activity in a format that both can use? When new facilities and roads are added or changed, only one map then needs to be updated, which then updates the common data on all of the functional maps automatically. Maps documenting property boundaries and legal land descriptions need the greatest accuracy. It is a tragedy when one functional group at an activity spends a great amount of money to create an installation map to document and track their specific data, only to find out that another functional group who would like to use that map must cannot because it does not have the required accuracy. They are then faced with spending another large amount of money re-creating something that, if it had been coordinated properly the first time, could have served both purposes. Installation maps should be prepared only one time with the objective to meet the strictest requirements at an activity, then distributed to all functional areas for use.

There are valid concerns about the security of some of the functional data at an activity. That data cannot be shared or distributed beyond strict limitations. Security of functional data need not be compromised when a common installation map is used because the data can be isolated and access restricted to only those that need the access.

HISTORY OF DESMS

In 1994 the Deputy Under-Secretary of Defense for Environmental Security (DUSD(ES)) tasked the Department of Defense Environmental Security Corporate Information Management (DESCIM) Project Management Office (PMO) to form a partnership with the Department of Defense Explosives Safety Board (DDESB) to embark upon the Explosives Safety Corporate Information Management (CIM) Initiative. This initiative is designed to develop an automated capability for up to 80% of the functionality required in the explosives safety community with the ultimate goal of 100% automation. It is also intended to coordinate DoD automated systems so that common data can be readily exchanged between similar systems. This is best accomplished

by standardizing common data on a DoD level. Automated systems that best met the required functionality of explosives safety were to be identified and selected as 'migration systems'. All migration systems that fell short of the 80% required functionality were to be improved and enhanced to meet that goal. Once fielded, the explosives safety migration systems will continue to be enhanced and modified to interface with other pertinent systems. The combination of these systems will comprise DESMS.

Early coordination sessions consisting of DoD and service functional and technical participants defined high level functional explosives safety requirements. Subsequent sessions subdivided the explosives safety effort into five functional sub-activities concentrating in specific explosives safety problem areas. The five explosives safety sub-activities identified are:

1. Explosives Safety Policy
2. Accident, Incident, and Malfunction Reporting and Analysis
3. Explosion Models
4. Site Planning, Waivers, and Exemptions
5. Unexploded ordnance (UXO)/ordnance and Explosive Waste (OEW) Contaminated Lands

DESCIM was directed to develop an automated capability in each of the above sub-activities that will provide up to 80% of the required functionality identified in the coordination sessions.

A Tri-Service DoD functional steering group identified and evaluated approximately 80 automated systems (software) that related to one or more of the above sub-activities. The most advanced and well-developed system(s) related to each of the sub-activities was selected to function as the migration system. The DUSD(ES) approved the migration systems recommended by DESCIM and the DDESB, and work has begun enhancing these migration systems to develop DESMS. As the migration systems evolve and additional capabilities are added to the software, interim versions are beta tested and fielded DoD-wide.

Once established, the DESMS will be the foundation for the DUSD(ES) target system. The DUSD(ES) target system will support 100% of the explosives safety functional requirements.

The DESCIM PMO ensures that enhancing and fielding of the migration systems, DESMS, and the DUSD(ES) Target System are in line with functional and technical conditions. Examples of these conditions are:

1. Continuous support by the functional community
2. An operational Configuration Management Board (CMB)
3. Identification and resolution of cross-functional issues
4. Configuration Management of information systems
5. Interfaces among information systems and a seamless exchange of standard and non-standard data elements among systems
6. Transition to an open systems environment (OSE) and the DUSD(ES) target system

A synopsis of the status of each of the sub-activities is given below:

EXPLOSIVES SAFETY POLICY (Policy Module)

Objective

The Policy module will provide the DESMS Steering Group and the entire DoD community with the capability to monitor and comment on pending and proposed legislation. The Steering Group (either alternate or primary DDESB Board Members representing each Service) will be responsible for providing the program maintenance. The Policy Module will be the source through which explosives safety policies, regulations and criteria will be developed and distributed. Guidance will be provided regarding policy implementation. Document management and imaging technology is being used to create electronic libraries of DDESB data repositories that will be accessible online. The electronic repository is being considered to include documentation on Site Surveys, Historical File of Decisions, DDESB Meeting Minutes, DDESB Explosives Safety Seminar Proceedings, and DDESB Technical Libraries. The DDESB will control user access to selected portions of the repository as required by normal security guidelines.

Status

Scanning and Optical Character Recognition (OCR) has already been completed on some of the DDESB document libraries. Scanning is continuing on the remaining DDESB libraries this year and will continue into next year. The libraries will be put online as they become available. Access to the libraries will be via Internet through the Defense Environmental Network and Information Exchange (DENIX) System and the DDESB Home Page. In FY99, DESCIM anticipates that the DDESB siting approval process for explosives-related facilities will begin to be converted to a paperless format. Siting approval requests will be able to be submitted and tracked electronically. Siting approval requests that are submitted in the normal hard copy format will be scanned into electronic format before review and approval. The electronic format will be used for archival purposes.

ACCIDENT, INCIDENT, AND MALFUNCTION REPORTING (Mishap Module)

Objective

The mishap module will provide a mechanism to track and analyze explosives safety mishaps. It tracks mishap data from all branches of the service, DoD and its contractors. DoD users are allowed to obtain and exchange mishap information. The information is comprehensive, documenting explosives-related mishaps dating back into the 1800's. Users can review the experiences of others when dealing with similar hazardous materials and operations. This will support remedial and abatement actions. Statistical and trend analyses can be performed across a wide range of user-defined queries.

Status

A Web site and migration system titled The Defense Explosives Safety Mishap Analysis Module (ESMAM) has been developed, and may be accessed via 'hot-link' from the DDESB home page. ESMAM is a comprehensive list of explosives mishaps consolidated from the

military services' safety centers. ESMAM data is privileged limited-use safety information resulting from investigations of Department of Defense (DoD) mishaps. Access is allowed for the purpose of evaluating and managing DoD safety programs and for DoD mishap prevention only. A user ID and password is required to access this data. Authorized users can access ESMAM on the World Wide Web (WWW). The URL for the ESMAM home page is: www.dac.army.mil/esmam/.

ESMAM provides the Department of Defense Explosives Safety Board (DDESB), service headquarters personnel, and DoD users in the field with data to identify and assess hazards inherent in explosives operations. This data can be used as a risk management tool to identify operational risks and take reasonable measures to reduce or eliminate hazards.

ESMAM keeps track of explosives mishap data for the Army, Navy, Air Force, Marine Corps, and Defense Contract Management Command. It is a comprehensive list of explosives mishaps. Currently the Air Force and Navy are working out details of how their future mishap data will be regularly input into the database.

EXPLOSION MODELS (Explosives Safety Module)

Objective

This module will assist the user and DoD regulatory agencies to validate that current policies are comprehensive and up-to-date. It will focus on the integration and development of hazard prediction models. Points of contact will be provided for technical assistance, expert testimony, and alternative compliance scenarios to the explosives safety community. Overall goals of the module are to provide an automated method to determine/predict the impact of explosions or fires to an area (e.g., environmental impact, number of injuries or deaths, structural and resource damage, etc.).

Status

A number of stand-alone software packages have been identified (15+) that relate to the modeling and prediction of explosion effects. Most all of these procedures are government developed and government owned. They will ultimately be connected together through common user interfaces. Additional modeling capabilities will be developed as required.

Although there are integration projects moving forward at NFESC, USAE Huntsville and the Defense Special Warfare Agency (DSWA) involving some of the above identified systems, they have not to date been coordinated. Work on this module is not expected to be formally funded by DESCIM until FY00.

SITE PLANNING, WAIVERS, AND EXEMPTIONS (Explosives Safety Siting Module)

Objective

The Explosives Safety Siting (ESS) Module will provide an automated tool to evaluate and pre-approve site plans for the storage of explosives according to DoD, Army, Navy or Air Force siting criteria. The module will track the issuance and status of waivers and exemptions. It will enable review of waivers abatement actions. It will also be designed to enable the tracking

and review of violations and corrective actions.

Status

This module has a high priority within DESMS and DDESB. DESCIM initially selected the ASHS site planning and evaluation program developed at Eglin AFB as the migration system. For several reasons, DESCIM withdrew formal sponsorship in FY97 and began development of a second automated explosives safety site planning tool called Explosives Safety Siting (ESS). Version 1.0 of ESS has been completed and is being demonstrated during the DESMS poster board session at this seminar. Work has continued on the ASHS software through Air Force sponsorship and a subsequent version of ASHS (Version 2) has been released. DDESB, DESCIM and NFESC representatives recently visited with sponsors and developers of ASHS to evaluate the updated capabilities of the software. Both ESS and ASHS have strengths and weaknesses that complement each other. ASHS has once again been selected as a migration system for automated site planning and will also be demonstrated at the DESMS poster board session. Beginning in FY99, the strengths of both siting packages will begin to be combined as DESMS evolves towards a DoD standardized "Target System".

Once the development of automated siting software has been completed, it must be kept current with dynamic DoD, Army, Navy and Air Force requirements. It is well known that DoD and service-specific explosives safety siting criteria is frequently revised (at times as often as every year). When we field a good, comprehensive siting tool, we have to be prepared to update that tool in a timely manner each time the criteria changes. What is the cost of such maintenance? Who will pay for those updates? These questions are of primary concern to DESMS. At present, there are very minimal budget funds available in the safety approval offices within each service and the DoD to maintain such a tool once it is put in place. The DDESB, Air Force Safety HQ, NFESC and the developers of the ASHS software are currently working out the architecture of an automated version of the DoD and service-specific explosives safety siting regulations (Q-D Engine) that will minimize the software maintenance costs. Each service has specific requirements that are all a subset of the DoD requirements. A DoD version of the Q-D Engine is currently under development at NFESC and will be complete in FY98. Approved versions of the Army, Navy and Air Force Q-D Engines are scheduled to be completed by June of 1999. When revisions to the siting criteria occur, updating the automated siting software will generally be as simple as downloading the latest version of the Q-D Engine from the respective siting approval authority and copying the new Q-D engine file over the old file.

The Q-D Engine itself will be application independent. In other words, the modules will be written so that any automated QD siting application can use them to perform QD analysis. All siting can then be done using officially approved methodology by obtaining a copy of the Q-D Engine (it comes in a DLL format) from the appropriate service and "plugging it in" to their application. The Q-D Engine can be executed under the Windows operating system, but does not require maps or graphics to run. Data input and output parameters are well documented so that it can be connected to any graphic or non-graphic software application that follows basic industry computer programming standards. This means that existing map-based explosives safety siting programs such as ASHS, ESS, Alpha/APMM and others will all be able to use the same modules. The development version of the DoD Q-D Engine will be demonstrated at the DESMS poster board session.

UNEXPLODED ORDNANCE (UXO)/ORDNANCE AND EXPLOSIVE WASTE (OEW) CONTAMINATED LANDS (UXO Module)

Objective

The Department of Defense (DoD) must be able to render safe and dispose of munitions that have been lost and subsequently found; used but not exploded; or damaged and not exploded. DoD also must shield the public from unexploded ordnance (UXO) areas where clearing or related safety measures are impractical or infeasible. Capabilities of this module must include:

1. Track UXO/OEW locations.
2. Manage explosive and environmental risks.
3. Provide for evaluation of remediation plans.
4. Enable identification and categorization of UXO/OEW hazards.
5. Support research, development, testing, and evaluation of explosives.

The module will become a set of computer programs that supports the:

1. Management of active ranges (RCRA & Munitions).
2. Inventorying of closed ranges (Range Rule).
3. Humanitarian clearing of land mines.
4. Rendering safe of unexploded ordnance.
5. Clearing of unexploded ordnance.

Status

A module known as The Unexploded Ammunition & Explosives Module (UXM) has been developed and is in its second version. The database currently tracks:

1. Installation information, including name and address of owner/occupier of the known or suspected unexploded ordnance site, and location of installation.
2. Ordnance location information, including size, general or specific area, surrounding topography and structures, and soil/hydrological data.
3. Amounts and kinds of known or suspected ordnance at a location.
4. Technical information about subject ordnance (if known), including fusing data, contained material data, and dimensions or weight of identified pieces.
5. Suspected age of ordnance.

Currently, DESMS is in discussions to develop Memorandums of Understanding to adopt existing, automated procedures as migration systems to perform three of the five functions listed above. The automated systems targeted to be included in the DESMS UXM Module include the following:

1. Humanitarian Demining Operations Geographic Information System (HDOGIS) to track humanitarian clearing of land mines. This software was developed by the Special Operations and Low Intensity Conflict Command (SOLIC) and Southern Command (SOCOM).

2. The Marine Corps has developed software to assist in the management of active ranges in coordination with the Naval EOD Technical Division. This software is called the Unexploded Ordnance Site Management Model (UXOSMM).
3. The Army Corps of Engineers in Huntsville has developed software to assist in the inventorying of Base Realignment and Closure (BRAC) and Formerly Used Defense (FUD) sites. They have also developed a system to document the Administrative Record. The Administrative Record documents the decision process associated with UXO issues and provides a repository for documentation supporting the decisions and actions taken.

Each of the above applications have been selected as migration systems to the DESMS program. Additional work will be scheduled in out-years to enhance their capabilities and integrate them with the DoD standardized database being developed by DESMS. In addition, the DoD standard data model will be expanded to include additional essential data entities identified in these migration systems.

SUMMARY

The DESMS system is tasked to develop migration systems that will automate up to 80% of the functional tasks in the field of Explosives Safety. The responsibilities associated with Explosives Safety have been subdivided into five major categories: Policy, Mishap, Unexploded Ordnance, Siting and Explosion Effects Modeling. Automated systems have been defined and are being enhanced in each category for DoD use. The automated processes and the data models used by DESMS must follow industry and DoD standards for format and execution to be compatible with the existing and future databases that will be developed at the typical DoD installation. By following these standards, tens of millions of dollars will be saved in the mapping and planning process because common data can be readily exchanged. DESMS is taking full advantage of state-of-the-art technology and existing software to leverage the investment dollars expended in the field of explosives safety and to deliver automated products that will be useful to all users from the installation level to the approval authorities.